



Enterprise Reality

**New Orleans
May 3-6, 1998**





Creating Data Confidence Through Access Controls and Electronic Signatures

Carol Mancuso

czm@inel.gov

**Lockheed Martin Idaho Technologies Company
Idaho National Engineering and Environmental Laboratory**

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Enterprise Reality

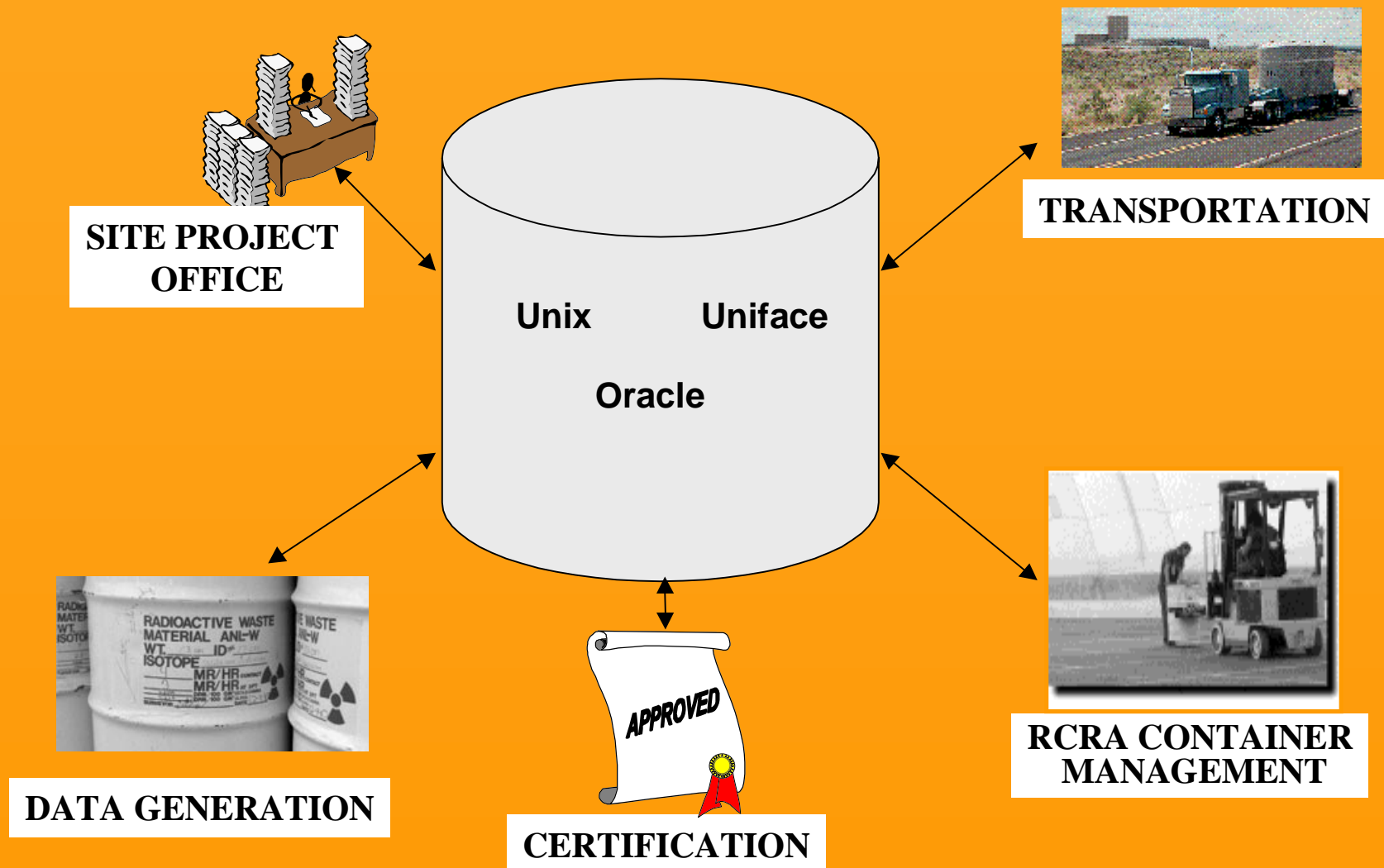
Overview

- **Summary of the TRIPS application**
- **Critical business needs**
- **Security model**
- **Electronic signature applied to databases**

The Problem

- **Significant quantity of Nuclear Waste**
- **Governor's agreement with the Federal Government**
- **Recorded content questionable**
- **Stringent requirements on what can be shipped**

TRIPS



TRIPS Characteristics

- **Wide**
 - Large variety of information
 - Many subsystem interfaces
- **Shallow**
 - Relatively few records
- **Complex**
 - Data Acquisition
 - Work Flow Enhancement
 - Inventory Tracking
 - Compliance Monitoring



Critical Needs for Success

- **Ensure a high degree of trust in the data**
- **Provide secure environment for a geographically dispersed user group while minimizing client maintenance**
- **Enhance process throughput by reducing paper handling (including pen/ink signatures)**



Solutions

- **Server centric architecture**
 - Security Model
 - Application Distribution
- **Electronic signature**

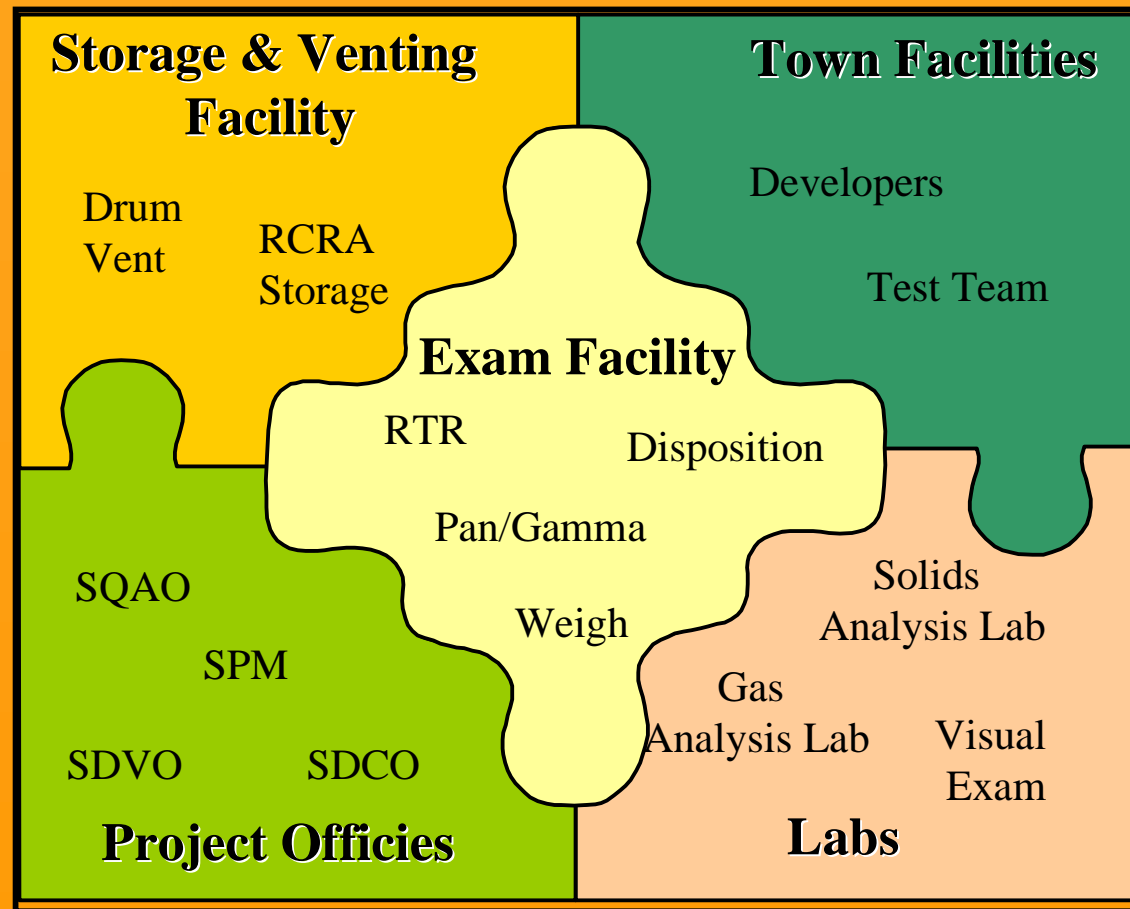


Security Model Requirements

- Accommodate a geographically dispersed user group
- Minimize maintenance associated with client platforms
- Guarantee protection of the system
- Maintain flexibility in connecting to diverse data sources



TRIPS User Community

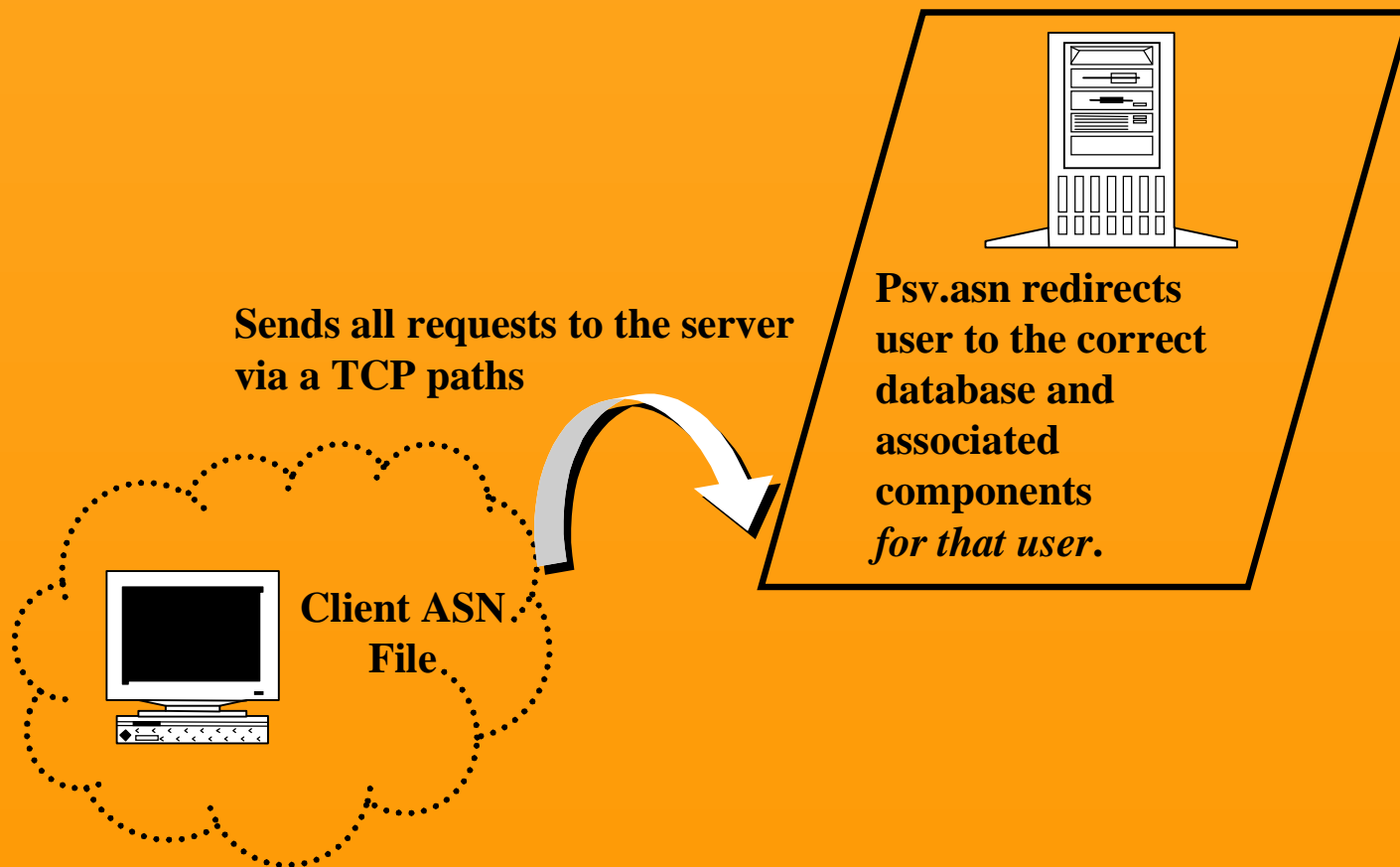


Approach for the Security Model

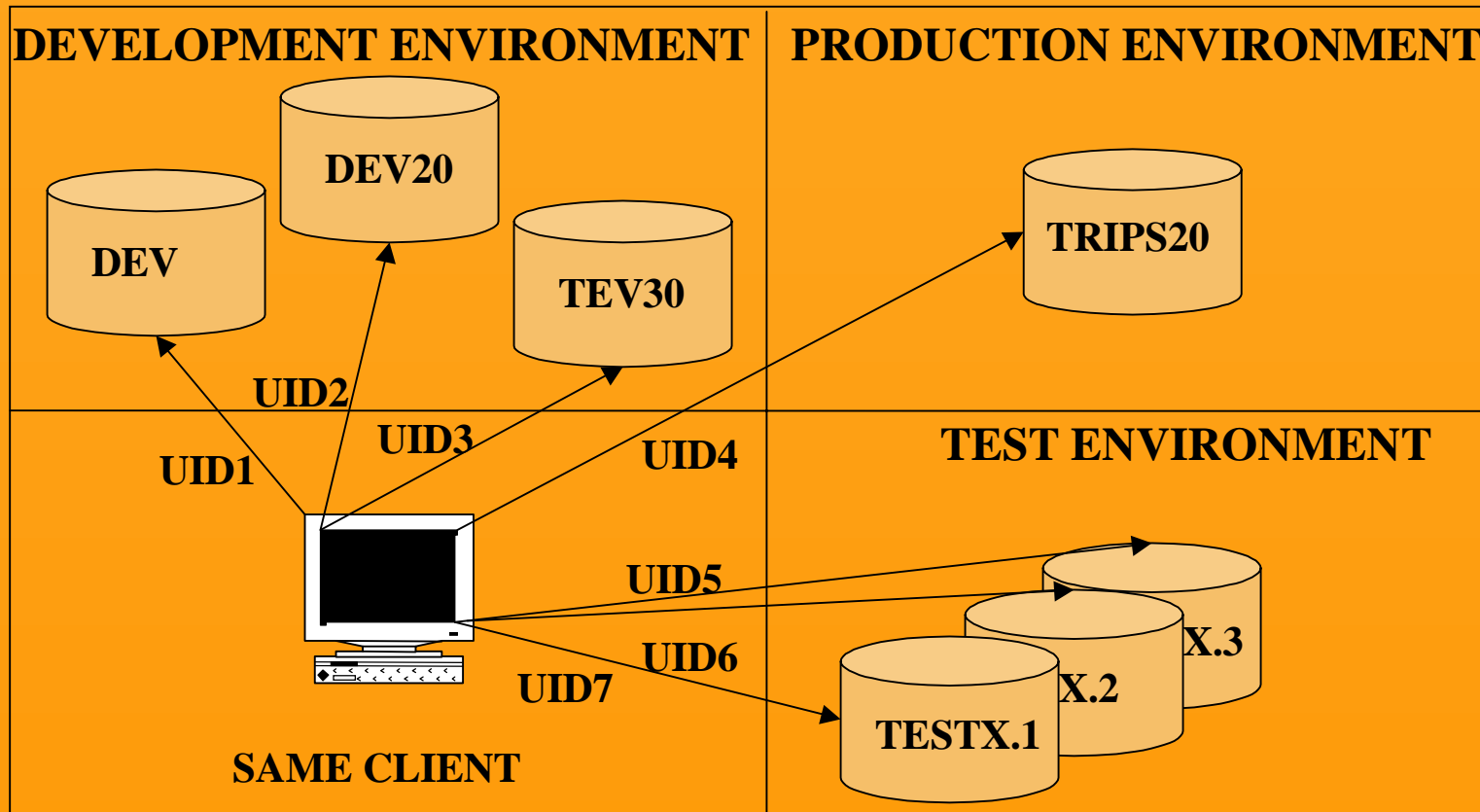
- **Minimize client dependence**
 - Client security not counted as part of the model
 - Centralized assignment file maintenance
 - Forms served from server via Polyserver
- **Guarantee system security**
 - Use Unix system authentication with restricted shells
 - Use Oracle role-based access controls
 - Use TRIPS role-based navigation restrictions



Smoke and Mirrors



Useful Redirection



UID1 - UID 3 = member of the development team

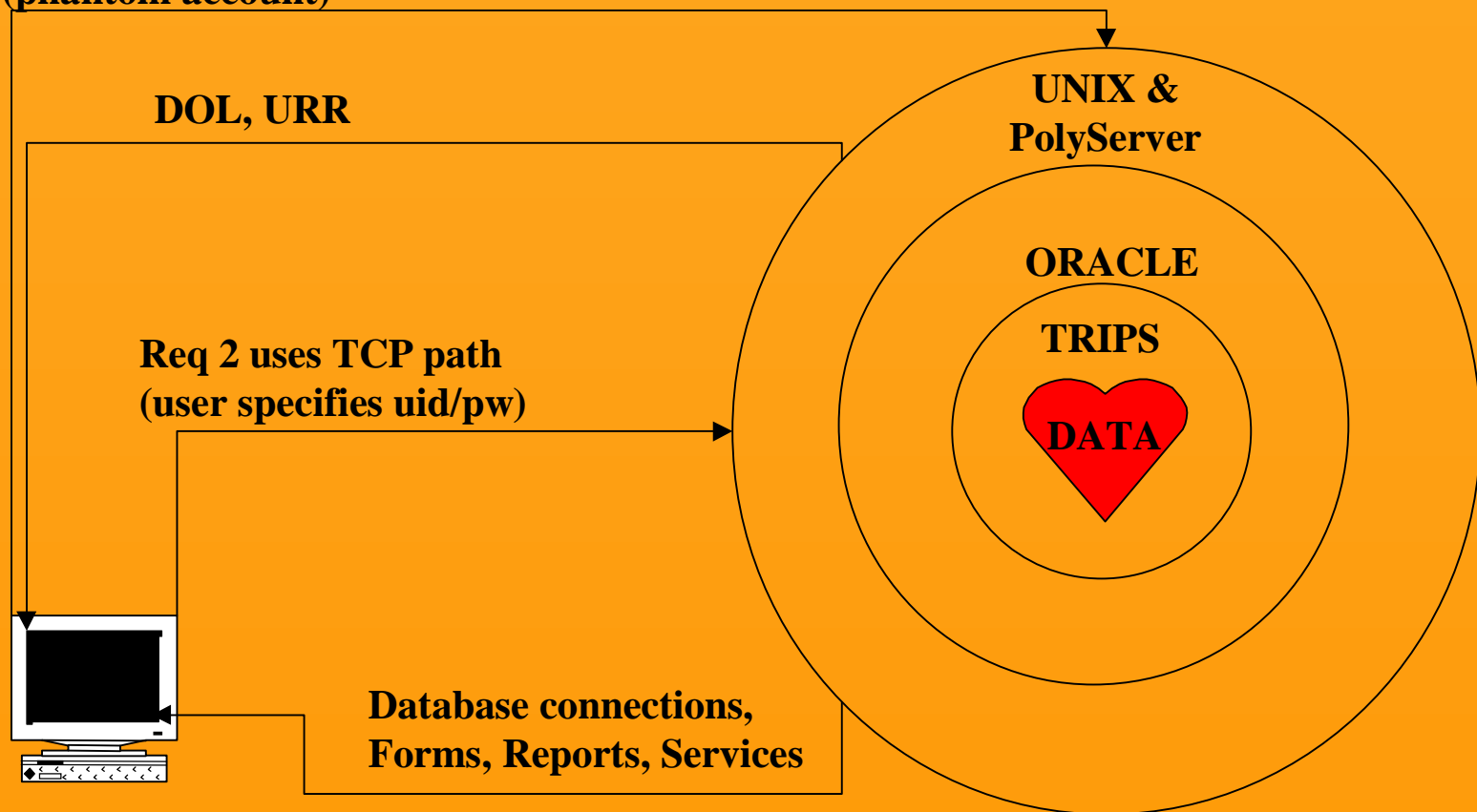
UID4 = drum-vent operator

UID5 - UID7 = member of the test team



The Onion

Req 1 uses TCP2 path
(phantom account)



Unsecured Client
runs UNIFACE runtime

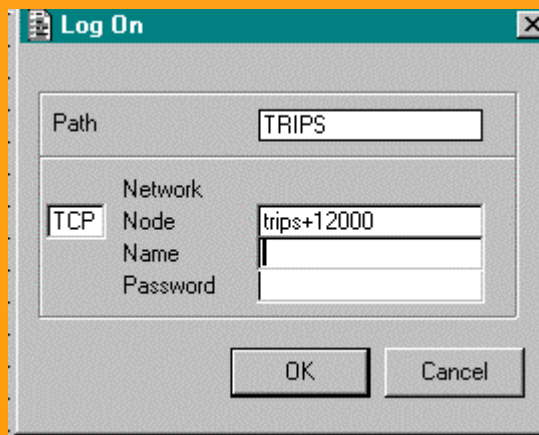


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Enterprise Reality

14

Log On



A screenshot of a Windows-style dialog box titled "Log On". The dialog box has a teal title bar with a close button (X) in the top right corner. The main area is light gray and contains several input fields. At the top, there is a "Path" label followed by a text box containing "TRIPS". Below this, there is a "Network" label followed by a dropdown menu showing "TCP". To the right of the "Network" dropdown, there are three stacked text boxes: the top one contains "trips+12000", the middle one is empty, and the bottom one is empty. These are labeled "Node", "Name", and "Password" respectively. At the bottom of the dialog box, there are two buttons: "OK" and "Cancel".

Role Selection

czm/no-role ts_ac_02nf tdev30 No Edit

Select From All TRIPS Roles (Developers)

| Code | Description |
|------------|--|
| ACL-OP | ACL Data Transfer Operator |
| ACL-QA | ACL Quality Assurance Officer |
| ANL-CM | ANL-W Container Management |
| ANL-OP | ANL-W Data Entry Operator |
| ANL-QA | ANL-W Quality Assurance Officer |
| ADM-AUD | Admin - Audit Data |
| ADM-REF | Admin - Reference Data |
| ADM-REF-RO | Admin - Reference Data READ-ONLY |
| ADM-DEV | Admin - System Reference Data |
| ADM-SU | Admin - Users/Roles |
| CM-IM | Container Management Inventory Manager |
| CM-OP | Container Management Operator |
| DVF-IR | Drum Vent Fac Ind Review |
| DVF-OP | Drum Vent Fac Operator |
| DVF-QA | Drum Vent Fac Quality Assurance Officer |
| DVF-TS | Drum Vent Fac Tech Supervisor |
| ECL-OP | ECL Data Transfer Operator |
| ECL-QA | ECL Quality Assurance Officer |
| SPD_TEST | Old Test Point for SPD |
| PAN-IR | Pan-Gamma Independent Reviewer |
| PAN-OP | Pan-Gamma Operator |
| PAN-QA | Pan-Gamma Quality Assurance Officer |
| PAN-TS | Pan-Gamma Technical Supervisor |
| PROG-MF | Programmer Access to all Maintenance Forms |
| RCRA-CO | RCRA Compliance Officer |
| RCT-OP | RCT Station Operator |
| RTR-IR | RTR Independant Reviewer |
| RTR-OP | RTR Operator |
| RTR-QA | RTR Quality Assurance |
| RTR-TS | RTR Technical Supervisor |
| SPD-TEST | SPD Test of WWS Xfer |
| SWP-DIS | SwEPP Disposition Operator |
| SRC | Shipping Receiving Coordinator |
| SPD-SDVO | Site Data Validation Officer |
| SPD-SDCO | Site Document Control Officer |

Select Role Exit



DVF-IR Role

czm/DVF-IR td_dv_02nf tdev30

DVF Batches for Review

| Status | Number | Date Closed | Comments | *1 | *2 |
|-------------------------------|-----------|--------------------|---------------------------------------|-------------------------------------|-------------------------------------|
| Independent Reviewer Approved | PRF970001 | 10-jul-97 05:45:00 | Test Data Phase 1 Containers | <input type="checkbox"/> | <input type="checkbox"/> |
| Independent Reviewer Approved | PRF970003 | 15-jul-97 06:00:00 | Test Data Phase 1 Containers | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Independent Reviewer Approved | PRF970011 | 12-dec-97 04:06:52 | | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Originator Acquired | FTR970003 | 16-oct-97 04:45:00 | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Originator Acquired | FTR970006 | 05-feb-98 07:49:00 | | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Originator Acquired | FTR970007 | 05-feb-98 07:51:00 | | <input type="checkbox"/> | <input type="checkbox"/> |
| Originator Acquired | PRF970005 | 18-jul-97 06:45:00 | Test Data Graphite WS - Test | <input type="checkbox"/> | <input type="checkbox"/> |
| Originator Acquired | PRF970006 | 21-jul-97 07:34:00 | Test Data Phase 1 Containers 003-4idc | <input type="checkbox"/> | <input type="checkbox"/> |

Procedure: MCP - 1815 RWMC/SWEPP Level 1 Data Validation Revision: 2

*1 Chemist Review Signature Needed
*2 Batch Approval Signature Needed

Signature View Batch Save Comments Close



DVF-IR Role Cont.

czm/DVF-IR td_dv_01sf1 tdev30

DVF Direct Sampling Batch

Number: PRF970001 Batch Comments: Test Data Phase 1 Containers
 Date Closed: 10-jul-97 05:45:00
 Status: Independent Reviewer Approved

R - Role Approver - Signer - Date
☐ DVF-IR schasj 09-dec-97 01:26:32

| Drum | Date | WC Number | A | C | D | H | P | R | S |
|------|--------------------|---------------|---|---|---|---|---|---|---|
| Vent | 10-jul-97 07:00:00 | IDRF074112369 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF074112440 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF074112379 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF074112389 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF074112463 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741200540 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741200665 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741200963 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741201017 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741202245 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741202361 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741202370 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741204226 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741204240 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF001903207 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741204340 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741205139 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741205229 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741205286 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741205310 | | | | | | | |

| Gas Sample | Type | Date | WC Number | A | C | D | H | P | R | S |
|------------|------|--------------------|---------------|---|---|---|---|---|---|---|
| HS | | 10-jul-97 07:35:10 | IDRF074112369 | | | | | | | |
| DUP | | 10-jul-97 07:45:40 | IDRF074112379 | | | | | | | |
| HSG | | 10-jul-97 07:50:55 | IDRF074112389 | | | | | | | |
| HSG | | 10-jul-97 07:58:50 | IDRF074112440 | | | | | | | |
| HSG | | 10-jul-97 08:05:45 | IDRF074112463 | | | | | | | |
| HSG | | 10-jul-97 08:15:20 | IDRF741200540 | | | | | | | |
| HSG | | 10-jul-97 08:22:50 | IDRF741200665 | | | | | | | |
| HSG | | 10-jul-97 08:30:05 | IDRF741200963 | | | | | | | |
| HSG | | 10-jul-97 08:40:35 | IDRF741201017 | | | | | | | |
| HSG | | 10-jul-97 08:49:35 | IDRF741202245 | | | | | | | |
| HSG | | 10-jul-97 09:00:35 | IDRF741202361 | | | | | | | |
| HSG | | 10-jul-97 09:09:45 | IDRF741202370 | | | | | | | |
| HSG | | 10-jul-97 09:19:05 | IDRF741204226 | | | | | | | |
| HSG | | 10-jul-97 09:30:20 | IDRF741204240 | | | | | | | |
| HSG | | 10-jul-97 09:40:05 | IDRF001903207 | | | | | | | |
| HSG | | 10-jul-97 09:49:30 | IDRF741204340 | | | | | | | |
| HSG | | 10-jul-97 09:58:05 | IDRF741205139 | | | | | | | |
| HSG | | 10-jul-97 10:08:05 | IDRF741205229 | | | | | | | |
| HSG | | 10-jul-97 10:20:50 | IDRF741205286 | | | | | | | |
| HSG | | 10-jul-97 10:31:40 | IDRF741205310 | | | | | | | |
| EB | | 15-jul-97 01:00:20 | IDRF074316819 | | | | | | | |

Checklist Type: PRF-IR Date: 09-dec-97 01:26:25 Signed by: schasj A C D H P R S

Flag Legend
 A - Anomalies Exist P - Permanently Rejected
 C - Comments Exist R - Rework Needed
 D - Deficient S - Superseded Data Exists
 H - History Exists

View/Add Anomalies View Data Details Add Checklist Approve Reject OK Close



DVF-IR Role Cont.

czm/DVF-IR td_vd_01sf215724 tdev30

Drum Vent Data

| Batch Number | Batch Status | Batch Comments |
|--------------|-------------------------------|------------------------------|
| PRF970001 | Independent Reviewer Approved | Test Data Phase 1 Containers |

Waste Container Number: IDRF074112369 SWEPP: 200000 Drum Vent Data Status: Originator Acquired

Filter Type: Standard Activated Charcoal Filter Lot: 07 Filter Serial Number:

Operator: fos Date Created: 10-jul-97 07:00:00

Comments:

Modifier: Date Modified: Modifier Role:

Change Reason:

Procedure: TPR - 1728 Manual Drum Gas Sampling Revision: 14

Add Anomalies View History OK Cancel



SPO-SDVO Role

czm/no-role ts_ac_02nf tdev30 No Edit

Select From All TRIPS Roles (Developers)

| Code | Description |
|------------|--|
| ACL-OP | ACL Data Transfer Operator |
| ACL-QA | ACL Quality Assurance Officer |
| ANL-CM | ANL-W Container Management |
| ANL-OP | ANL-W Data Entry Operator |
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| ADM-AUD | Admin - Audit Data |
| ADM-REF | Admin - Reference Data |
| ADM-REF-RO | Admin - Reference Data READ-ONLY |
| ADM-DEV | Admin - System Reference Data |
| ADM-SU | Admin - Users/Roles |
| CM-IM | Container Management Inventory Manager |
| CM-OP | Container Management Operator |
| DVF-IR | Drum Vent Fac Ind Review |
| DVF-OP | Drum Vent Fac Operator |
| DVF-QA | Drum Vent Fac Quality Assurance Officer |
| DVF-TS | Drum Vent Fac Tech Supervisor |
| ECL-OP | ECL Data Transfer Operator |
| ECL-QA | ECL Quality Assurance Officer |
| SPD_TEST | Old Test Point for SPD |
| PAN-IR | Pan-Gamma Independent Reviewer |
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| PAN-QA | Pan-Gamma Quality Assurance Officer |
| PAN-TS | Pan-Gamma Technical Supervisor |
| PROG-MF | Programmer Access to all Maintenance Forms |
| RCRA-CO | RCRA Compliance Officer |
| RCT-OP | RCT Station Operator |
| RTR-IR | RTR Independent Reviewer |
| RTR-OP | RTR Operator |
| RTR-QA | RTR Quality Assurance |
| RTR-TS | RTR Technical Supervisor |
| SPD-TEST | SPD Test of WWIS Xier |
| SWP-DIS | SWEPP Disposition Operator |
| SRC | Shipping Receiving Coordinator |
| SPD-SDVO | Site Data Validation Officer |
| SPD-SDCO | Site Document Control Officer |

Select Role Exit



SPO-SDVO Role Cont.

czm/SPO-SDVO tp_dr_01nf tdev30 No Edit

Batch Types

| Type | Description |
|--------|--|
| ACL-RP | Analytical Chemistry Lab Report Batch |
| ANL-RP | Argonne West Report |
| ECL-RP | Environmental Chemistry Lab Report Batch |
| FTR | Online Gas Analysis using FTIRS and RGA |
| HRA | HFEF Hot Repair Area Batch |
| PRF | Prefilter Field Samples Direct or manifold HSG |
| RTR | RTR experiment - Table usage= RTR_EV |
| SAS | Swepp Assay System (PAN) |
| SCH | HFEF Spray Chamber |
| SWE | SWEPP Batch |

View Data Cancel

SPO-SDVO Role Cont.

czm/SPO-SDVO td_dv_01qf tdev30 No Edit

DVF Direct Sampling Batch

Number: PRF970001 Batch Comments:

Date Closed: Status:

R - Role Approver - Signer - Date

☐

| Drum | Date | WC Number | A | C | D | H | P | R | S |
|------|----------------------|----------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Vent | <input type="text"/> | <input type="text"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| Gas | Type | Date | WC Number | A | C | D | H | P | R | S |
|--------|----------------------|----------------------|----------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Sample | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Checklist Type Date Signed by A C D H P R S

☐ ☐ ☐ ☐ ☐ ☐ ☐

Flag Legend

- A - Anomalies Exist
- C - Comments Exist
- D - Deficient
- H - History Exists
- P - Permanently Rejected
- R - Rework Needed
- S - Superseded Data Exists

View Anomalies View Data Details Query Cancel



SPO-SDVO Role Cont.

czm/SP0-SDVO td_dv_01qf tdev30 No Edit

DVF Direct Sampling Batch

Number: Batch Comments:

Date Closed: Status:

R - Role Approver - Signer Date
☐ DVF-IR schasj 09-dec-97 01:26:32

| Drum Vent | Date | WC Number | A | C | D | H | P | R | S |
|-----------|--------------------|---------------|---|---|---|---|---|---|---|
| | 10-jul-97 07:00:00 | IDRF074112369 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF074112440 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF074112379 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF074112389 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF074112463 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741200540 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741200665 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741200963 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741201017 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741202245 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741202361 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741202370 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741204226 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741204240 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF001903207 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741204340 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741205139 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741205229 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741205286 | | | | | | | |
| | 10-jul-97 12:00:00 | IDRF741205310 | | | | | | | |

| Gas Sample | Type | Date | WC Number | A | C | D | H | P | R | S |
|------------|------|--------------------|---------------|---|---|---|---|---|---|---|
| | HS | 10-jul-97 07:35:10 | IDRF074112369 | | | | | | | |
| | DUP | 10-jul-97 07:45:40 | IDRF074112379 | | | | | | | |
| | HSG | 10-jul-97 07:50:55 | IDRF074112389 | | | | | | | |
| | HSG | 10-jul-97 07:58:50 | IDRF074112440 | | | | | | | |
| | HSG | 10-jul-97 08:05:45 | IDRF074112463 | | | | | | | |
| | HSG | 10-jul-97 08:15:20 | IDRF741200540 | | | | | | | |
| | HSG | 10-jul-97 08:22:50 | IDRF741200665 | | | | | | | |
| | HSG | 10-jul-97 08:30:05 | IDRF741200963 | | | | | | | |
| | HSG | 10-jul-97 08:40:35 | IDRF741201017 | | | | | | | |
| | HSG | 10-jul-97 08:49:35 | IDRF741202245 | | | | | | | |
| | HSG | 10-jul-97 09:00:35 | IDRF741202361 | | | | | | | |
| | HSG | 10-jul-97 09:09:45 | IDRF741202370 | | | | | | | |
| | HSG | 10-jul-97 09:19:05 | IDRF741204226 | | | | | | | |
| | HSG | 10-jul-97 09:30:20 | IDRF741204240 | | | | | | | |
| | HSG | 10-jul-97 09:40:05 | IDRF001903207 | | | | | | | |
| | HSG | 10-jul-97 09:49:30 | IDRF741204340 | | | | | | | |
| | HSG | 10-jul-97 09:58:05 | IDRF741205139 | | | | | | | |
| | HSG | 10-jul-97 10:08:05 | IDRF741205229 | | | | | | | |
| | HSG | 10-jul-97 10:20:50 | IDRF741205286 | | | | | | | |
| | HSG | 10-jul-97 10:31:40 | IDRF741205310 | | | | | | | |

Checklist Type: Date: Signed by: A - C - D - H - P - R - S

Flag Legend
 A - Anomalies Exist P - Permanently Rejected
 C - Comments Exist R - Rework Needed
 D - Deficient S - Superseded Data Exists
 H - History Exists

View Anomalies View Data Details Clear Cancel



SPO-SDVO Role Cont.

czm/SPO-SDVO td_vd_01sf221218 tdev30 No Edit

Drum Vent Data

| Batch Number | Batch Status | Batch Comments |
|--------------|-------------------------------|------------------------------|
| PRF970001 | Independent Reviewer Approved | Test Data Phase 1 Containers |

Waste Container Number: IDRF074112369 SWEPP: 200000 Drum Vent Data Status: Originator Acquired

Filter Type: Standard Activated Charcoal Filter Lot: 07 Filter Serial Number:

Operator: fos Date Created: 10-jul-97 07:00:00

Comments:

Modifier: Date Modified: Modifier Role:

Change Reason:

Procedure: TPR - 1728 Manual Drum Gas Sampling Revision: 14

Add Anomalies View History OK Cancel



Benefits

- **End users can't easily tamper with their configuration**
- **Distribution of new system versions is simplified**
- **Enhances ability to segregate development, test, and production environments**
- **Enhances ability to do effective CM**



Electronic Signature

- What is it?
- TRIPS implementation of electronic signature
- TRIPS signature services
- TRIPS application of electronic signature to a database
- Benefits

Electronic Signature Options

- **Shared secret data access control**
- **Digitization of handwritten signature**
- **Biometric Signature**
- **Public Key Cryptography (chosen method)**

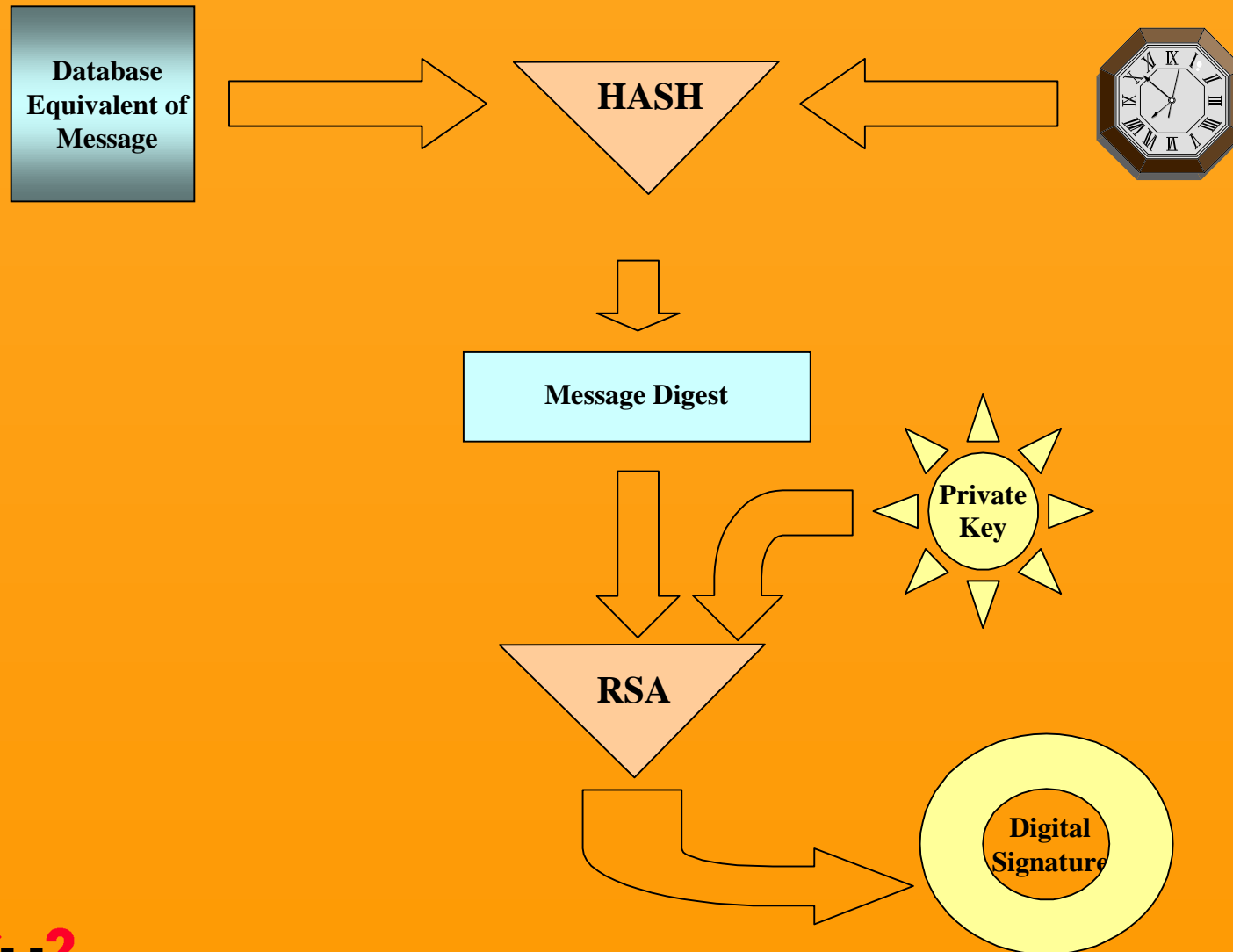
What is a Digital Signature?

- **Digital Signature is a unique set of bits which:**
 - represents the signers identity,
 - represents the data signed,
 - is non-reputable.

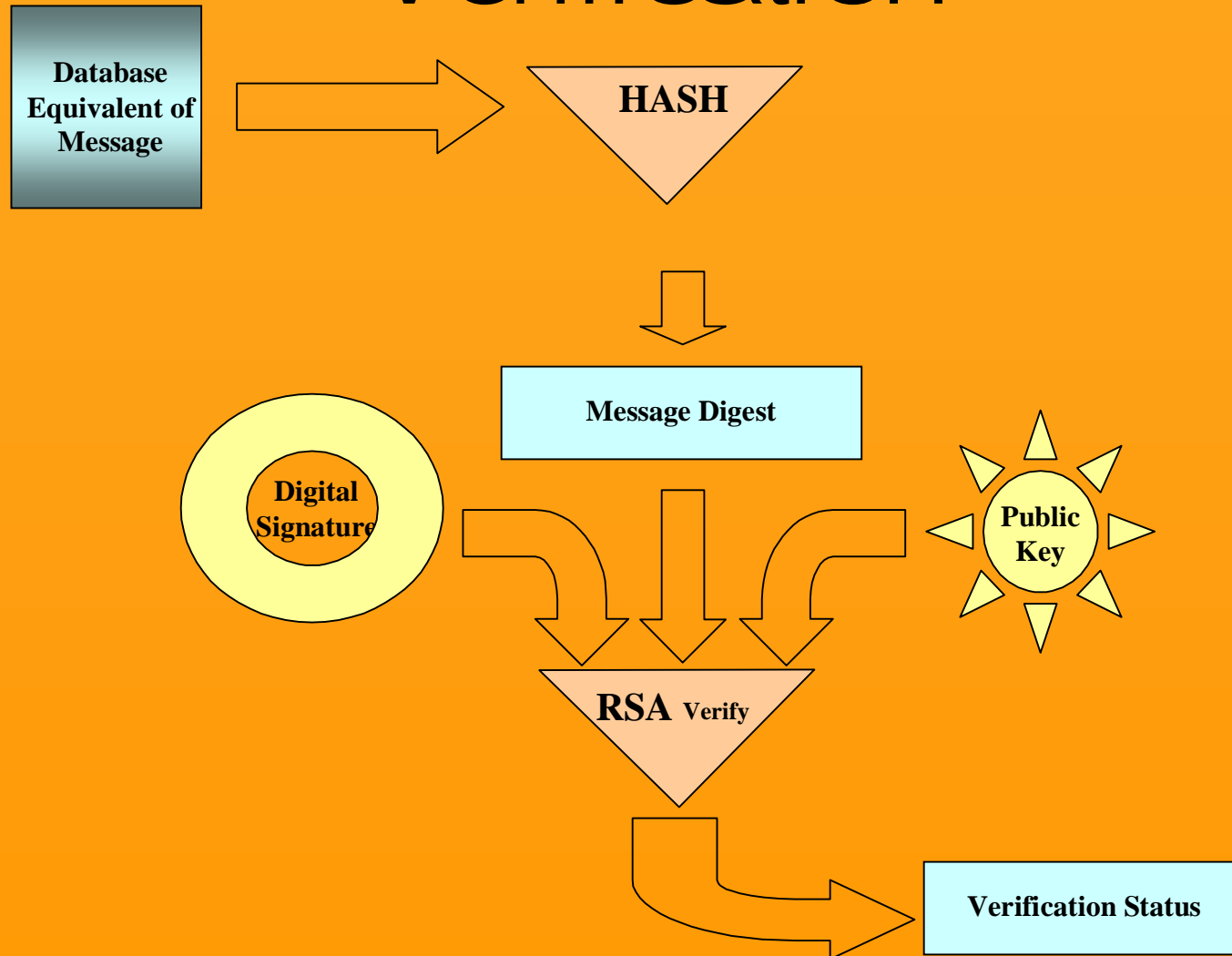
What is a Digital Signature?

- **Non-Reputable**: Authenticity of *both* data and signer is not questionable.
- **Public Key**: Verifies signature and is certified and widely distributed.
- **Private Key**: Creates the signature and is held privately by the signer.

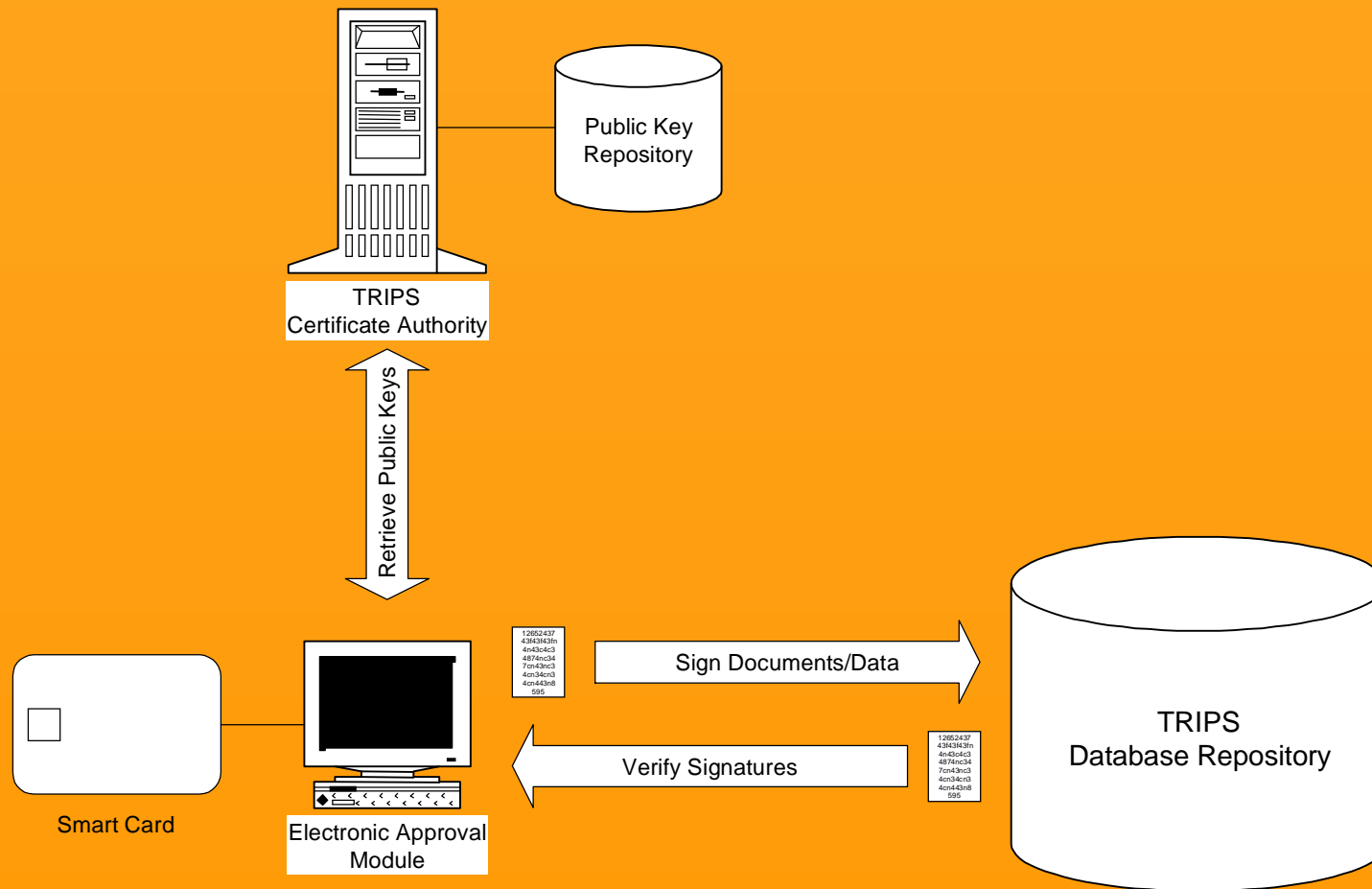
PKCS Signature Creation



PKCS Signature Verification



TRIPS Implementation

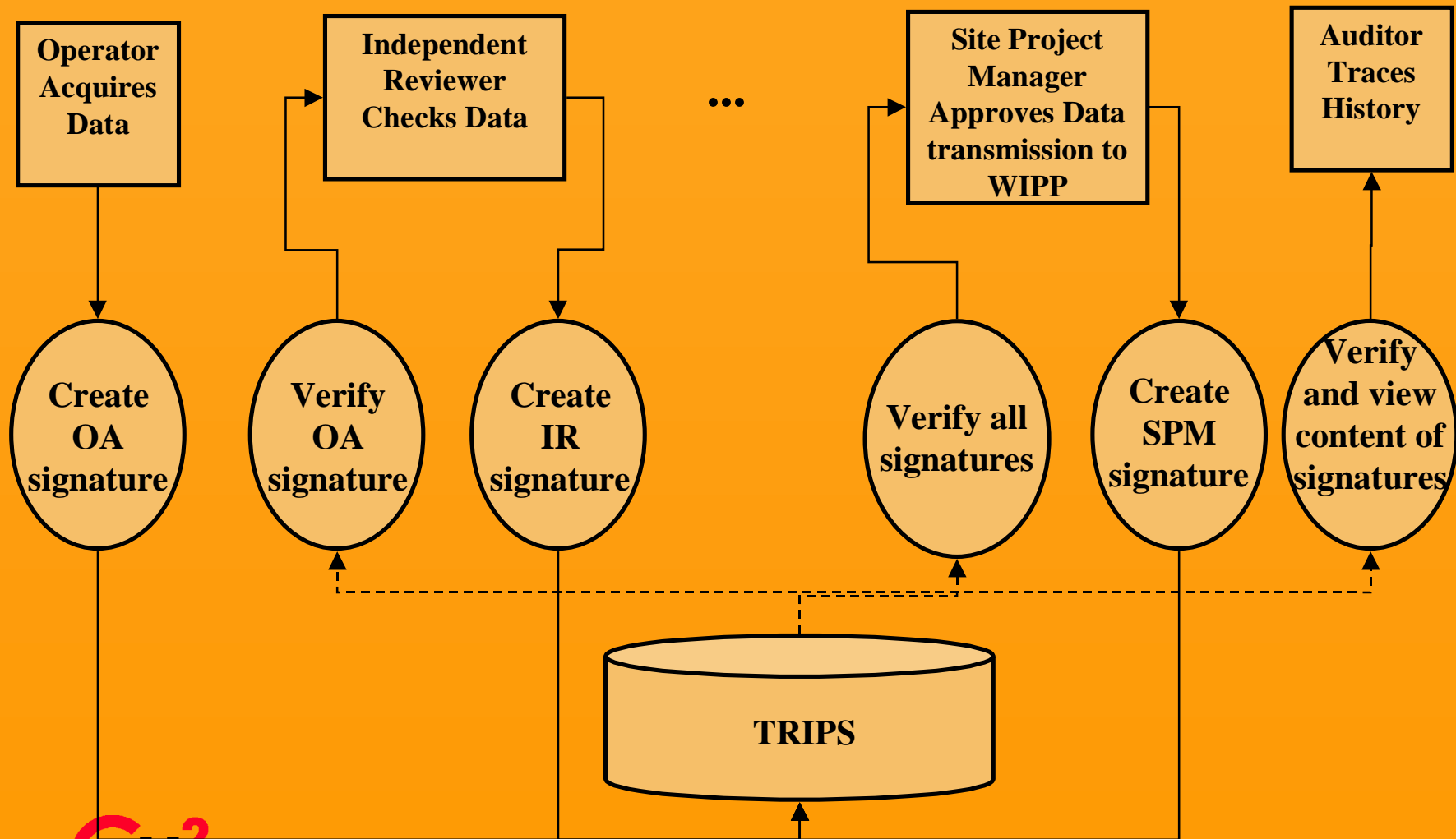


TRIPS Signature Services

- **Three signature types: approval set, batch, container set**
- **Two general types of services per signature type: sign, verify**
- **Implemented as hidden forms, *not* services (3GL interface required)**



Application of Electronic Signatures



Benefits

- **Eliminates paper**
- **Cost savings**
- **Legally binding**
- **In-process verification easier**
- **Tracking signatures becomes inherent**
- **Applicable to diverse applications**



CONTACTS

- **Business Contact**

- Toni Austin, Manager, Advanced Computer Interface Products
 - (208) 526-3140
 - ama@inel.gov

- **Technical Contact**

- Carol Mancuso, Project Level Subsystem Lead
 - (208) 526-2665
 - czm@inel.gov

- **Contributors**

- Ben Groeneveld, Software Technical Lead
- Wayne Austad, System Services Subsystem Lead
- Stuart Walsh, Electronic Signature Subsystem Lead
- Rich Oesterling, Configuration Management

